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FLOOD INSURANCE STUDY

TOWNSHIP OF TUNKHANNOCK, PENNSYLVANIA
WYOMING COUNTY

JULY 15, 1988

COMPLETED

Federal Emergency Management Agency

COMMUNITY NUMBER - 422206

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance study purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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FLOOD INSURANCE STUDY
TOWNSHIP OF TUNKHANNOCK, WYOMING COUNTY, PENNSYLVANIA

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Township of Tunkhannock, Wyoming County, Pennsylvania, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were prepared by Buchart-Horn, Inc., for the Federal Emergency Management Agency (FEMA), under Contract No. EMW-85-C-1960. This work was completed in January 1987.

1.3 Coordination

On December 3, 1984, an initial Consultation and Coordination Officer's (CCO) meeting was held with representatives of FEMA and the Township of Tunkhannock. Coordination with township officials and Federal, State, and regional agencies produced a variety of information pertaining to floodplain regulations, available community maps, flood history, and other hydrologic data.

The Susquehanna River Basin Commission (SRBC) was contacted for data on the Susquehanna River from the preparation of the Flood Insurance Study for the Township of Eaton. The U. S. Geological Survey (USGS) was contacted for statistical data of peak records for the USGS gage located at Pennsylvania. Township officials and local residents were contacted for input from past flood history and high-water marks. Vertical control data used to establish the network of

elevation reference marks were provided by the USGS. Bridge measurements for the new structure on State Route 29 spanning the Susquehanna River and on structures spanning Tunkhannock Creek along U. S. Route 6 were provided by the Pennsylvania Department of Transportation (District 4-0).

On September 2, 1987, a final CCO meeting was held with representatives of FEMA, the township, and Buchart-Horn, Inc. (the study contractor), to review the results of the study.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Township of Tunkhannock, Wyoming County, Pennsylvania. The Borough of Tunkhannock, which lies within the corporate limits of the township, is not included in this study. The area of study is shown on the Vicinity Map (Figure 1).

The following streams were studied by detailed methods: the Susquehanna River, for its entire length within the community; Tunkhannock Creek, from its confluence with the Susquehanna River to a point approximately 1.9 miles upstream of the most upstream crossing of U. S. Route 6; and Swale Brook, from a point approximately 580 feet downstream of the corporate limits to a point approximately 780 feet above the corporate limits. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction through January 1992.

The following flooding sources were studied by approximate methods: North Branch Tunkhannock Creek, South Branch Tunkhannock Creek, Billings Mill Brook, Kern Glen Creek, Lake Carey, Mill Run, Whippoorwill Hollow, Flow Pond, and the remaining portions of Swale Brook. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and the Township of Tunkhannock.

2.2 Community Description

The Township of Tunkhannock is located in Wyoming County in the northeastern portion of the Commonwealth of Pennsylvania, approximately 10 miles northwest of the City of Scranton. It is bordered by the Township of Lemon to the north, the Townships of Overfield and Fall to the east, the Township of Eaton to the south, the Township of Washington to the south, and the Borough of Factoryville to the northeast. The Township of Tunkhannock had a 1980 population of 4,399, an increase of 100 percent over the 1970

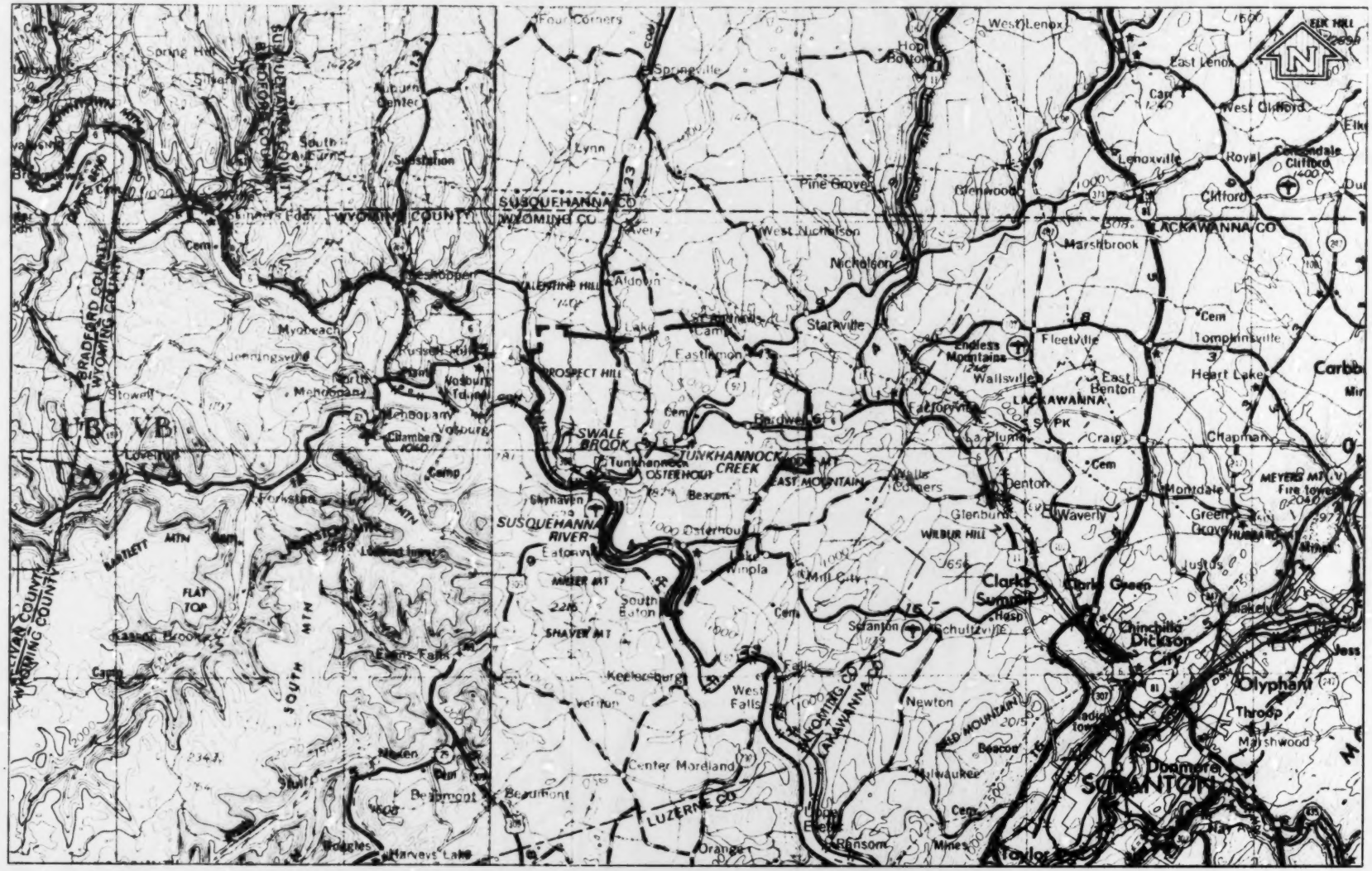


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF TUNKHANNOCK, PA

(WYOMING CO.)

APPROXIMATE SCALE

4 0 4 8 12 MILES

VICINITY MAP

population of 2,200 (Reference 1). The population of the township was 4,452 in 1984, and it is estimated that the population will increase approximately 50 percent from 1984 to the year 2000.

The total area contained with the corporate limits of the Township of Tunkhannock is 31.1 square miles. Forest occupies 65 percent of the land area. Other types of land use are agricultural (30 percent), and residential and commercial (5 percent). Most of the commercial development is located along U. S. Route 6. Because of the expanding population base, the township presents an attractive opportunity to commercial enterprises. Commercial development and the expansion of commercial land use is likely to continue, perhaps at accelerated rates. Forest land includes large public/quasi-public Game Commission lands. Sporadic mining operations are primarily limited to land and gravel operations.

Due to the rich alluvial soil on the banks of the north branch of the Susquehanna River and its tributaries, the leading occupations in the Township of Tunkhannock are dairying and agriculture. Paper manufacturing, and lumber and its manufacture are the leading industries. The Borough of Tunkhannock, located at the juncture of the Susquehanna River and Tunkhannock Creek, is the Wyoming County seat and the county's largest community.

The Susquehanna River and Tunkhannock Creek and its tributaries drain most of the township. Flood hazard areas along the floodplains contain some residential development, despite the fact that severe damage has occurred from the floods of 1972, 1975, and March 1986.

The township still shows many signs of the strong New England influence behind its early development. Tunkhannock was originally called Putnam after General Israel Putnam. The Indian influence is also evident within the township.

Climate in the area is continental but is modified by the effects of the Atlantic Ocean and the Gulf of Mexico. Mean annual temperature ranges in the low 50's (degrees Fahrenheit - ^{o}F), with extremes rarely rising above 100^{o}F or falling below 0^{o}F. Annual precipitation averages approximately 40 inches. While precipitation is fairly well distributed throughout the year, slightly over half falls between the months of April and September. During the summer months, the area is regularly subjected to afternoon and evening thunderstorms often accompanied by heavy rains and damaging winds. Also, remnants of hurricanes originating in the tropics occasionally pass through the vicinity bringing prolonged periods of heavy rainfall.

The topography of the area is characterized by gentle sloping areas along the floodplains and moderate to steep sloping areas along the

forest lands. The elevations in the township range from 570 feet on the banks of the Susquehanna River to 1,900 feet on the top of Osterhout Mountain.

2.3 Principal Flood Problems

The Susquehanna River and Tunkhannock Creek are the chief sources of major flood damage in the township. During Tropical Storm Agnes in June 1972, the Susquehanna River gage upstream at Towanda registered a record flow of 320,000 cubic feet per second (cfs), substantially exceeding the former record of 191,000 cfs set in 1946 (Reference 2). During Tropical Storm Eloise in September 1975, a flow of 221,000 cfs was recorded at Towanda (Reference 2). The return periods for the floods of 1972, 1946, and 1975 at the Towanda gage are approximately 400, 50, and 110 years, respectively, using the frequency curve that includes the effects of the Tioga-Hammond and Cowanesque Dams (Reference 2). Heavy rainfall from Tropical Storm Agnes also created severe runoff conditions that resulted in high flows on all local streams.

Most of the serious destruction arising from Tropical Storm Agnes took place in the Susquehanna River floodplain. Numerous permanent residences and summer cottages were flooded to second floor and rooftop levels. Residential and commercial structures along U. S. Route 6 near Tunkhannock Creek were also severely damaged by a combination of high flow in the creek and backwater from the Susquehanna River.

Tropical Storm Eloise of September 1975 brought a repetition of damages to many areas of the floodplain and other low-lying sections near Tunkhannock Creek.

In March 1986, the Tunkhannock Creek gage at Dixon recorded a flood discharge of 30,600 cfs. This is the second highest peak-discharge registered in the gage's 73 years of record. The corresponding return period for this discharge is approximately 23 years. Most of the damage from this flood resulted from first floor flooding of various residential areas along low-lying sections of Tunkhannock Creek. These areas included the Lazy Brook residential development, Hidden Acres Mobile Home Park, and the Shadow Brook KOA campground.

2.4 Flood Protection Measures

Six upstream dams contribute to the reduction of flood hazards from the Susquehanna River: East Sidney Lake, located approximately 8 miles east of Sidney, New York, on Ouleout Creek; Whitney Point Dam, located approximately 1 mile north of Whitney Point, New York, on the Otselic River; Almond Dam, located approximately 2 miles northwest of Hornell, New York, on Canacadea Creek; Arkport Dam, located approximately 5 miles northeast of Hornell, New York, on the

Canisteo River; Tioga-Hammond Dam, located 20 miles southwest of Elmira, New York, on the Tioga River and Crooked Creek; and Cowanesque Lake, located on the Cowanesque River approximately 2 miles above the confluence with the Tioga River at Lawrenceville. Of these, the four upstream dams existing in 1972 reduced the water-surface elevation on the Susquehanna River by approximately 0.5 foot at the Towanda gage during the Agnes flood.

Following the Agnes flood in 1972, an earthen levee was constructed around St. Peters Episcopal Church to protect that property from flooding of Tunkhannock Creek. The church is situated along the banks of Tunkhannock Creek at the downstream most U. S. Route 6 crossing in the Township of Tunkhannock. During the 1972 flood, this area was subject to backwater flooding from the Susquehanna River. The levee was constructed from private funds. FEMA specifies that all levees must have a minimum of 3 foot freeboard against 100-year flooding to be considered a safe flood protection structure. This levee does not meet the FEMA freeboard requirements.

The Baltimore District of the U. S. Army Corps of Engineers (COE) has just concluded an Initial Appraisal Study for a proposed flood protection levee between the Lazy Brook residential area and Tunkhannock Creek. The results of that study indicate a benefit-cost ratio of less than one; consequently, there are no immediate plans to continue this project.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each flooding source studied in detail affecting the community.

For the Susquehanna River, the peak discharges were obtained from the Flood Insurance Study for the Township of Eaton (Reference 3). The statistical analyses for these discharges were performed by the COE using flood peak discharge data for USGS stream gages at Towanda and Wilkes-Barre. The stream gage at Towanda is located approximately 51 miles upstream from the northwestern boundary of the township, and the stream gage at Wilkes-Barre is approximately 24 miles downstream from the southern corporate limits.

Flow frequencies for Tunkhannock Creek were based on a statistical analysis of peak-discharge records for the USGS gage located at Dixon, approximately 4 miles upstream from its confluence with the Susquehanna River. This analysis was performed in accordance with criteria outlined in Bulletin No. 17B (Reference 4). Frequency-discharge data were based on a USGS computer model run on September 26, 1986, using a systematic record of 73 years and a generalized skew coefficient. In March 1986, flooding on Tunkhannock Creek registered the second highest peak-discharge ever recorded at the gage station; consequently, inclusion of these statistical data in the USGS model resulted in revisions to the peak discharge-frequency curve. The resulting flood-frequency discharges were adjusted for the effect of the difference in drainage area between the gage and the mouth of Tunkhannock Creek by using the ratio of drainage areas to the 0.75 power.

The hydrology for Swale Brook was obtained from the Flood Insurance Study for the Borough of Tunkhannock (Reference 5). Since Swale Brook is an ungaged stream, information was obtained from the regional flood-frequency procedure developed by the COE (Reference 6). This procedure is based on a log-Pearson Type III analysis of a large number of station records in the Susquehanna River Basin through 1972.

A summary of the drainage area-peak discharge relationships for the streams studied by detailed methods is shown in Table 1, "Summary of Discharges."

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
SUSQUEHANNA RIVER					
At downstream corporate limits	9,539	160,000	221,000	248,000	324,000
At confluence of Tunkhannock Creek	8,913	154,000	212,000	238,000	308,000
TUNKHANNOCK CREEK					
At confluence with Susquehanna River	413	26,270	37,595	42,455	53,875
At USGS gage station at Dixon	383	24,825	35,530	40,120	50,915
SWALE BROOK					
At confluence of Tributary No. 1 to Swale Brook	1.95	730	1,640	2,250	4,600

Hydraulic data for the Susquehanna River were obtained from the Flood Insurance Study for the Township of Eaton (Reference 3). In that study, cross sections were obtained from aerial photographs. Cross-section data for Tunkhannock Creek were obtained from topographic maps compiled from aerial photographs and the Flood Insurance Study for the Borough of Tunkhannock (References 7 and 5). Below-water sections were obtained by field surveys. All bridges and culverts were surveyed to obtain elevation data and structural geometry.

Hydraulic data for Swale Creek was obtained from the Flood Insurance study for the Borough of Tunkhannock (Reference 5).

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the Flood Insurance Rate Map (Exhibit 2). Along certain portions of Tunkhannock Creek, a profile base line is shown on the maps to represent channel distances as indicated on the flood profiles and floodway data tables.

Water-surface elevations of floods of the selected recurrence intervals were computed using the COE HEC-2 step-backwater computer program (Reference 8). Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals. The starting water-surface elevations for the

Susquehanna River were obtained from the Flood Insurance Study for the Township of Eaton (Reference 3). The starting water-surface elevations for Tunkhannock Creek were started from its confluence with the Susquehanna River, which were developed during the Flood Insurance Study for the Borough of Tunkhannock (Reference 5). For Swale Brook, the starting water-surface elevations were obtained from the Flood Insurance Study for the Borough of Tunkhannock (Reference 5).

Channel and overbank roughness factors (Manning's "n") used in the hydraulic computations for Tunkhannock Creek were chosen by engineering judgment and were based on field observations and photographs of the stream and floodplain areas. The hydraulic model was tested and the "n" values adjusted within an acceptable range to best fit known high-water marks and elevations resulting from the March 1986 flood. The flood peak elevation for the gaging station at Dixon was obtained from the USGS and various high-water marks were derived through interviews with local residents along the floodplain. The Manning's "n" values for the Susquehanna River were obtained from the Flood Insurance Study for the Township of Eaton (Reference 3). The Manning's "n" values for Swale Brook were obtained from the Flood Insurance Study for the Borough of Tunkhannock (Reference 5). The channel and overbank "n" values for the streams studied by detailed methods are shown in the following tabulation:

Stream	Channel "n"	Overbank "n"
Susquehanna River	0.035–0.055	0.060–0.160
Tunkhannock Creek	0.025–0.045	0.040–0.200
Swale Brook	0.020–0.050	0.080–0.150

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the maps; the descriptions of the marks are presented in Elevation Reference Marks (Exhibit 3).

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For the streams studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:2,400 with a contour interval of 5 feet for the Susquehanna River, at a scale of 1:2,400 with a contour interval of 4 feet for Tunkhannock Creek, and at a scale of 1:24,00 with a contour interval of 20 feet for Swale Brook (References 7, 9, and 10).

For the streams studied by approximate methods, the boundary of the 100-year flood was delineated using the Flood Hazard Boundary Map for the Township of Tunkhannock (Reference 11).

The 100- and 500-year floodplain boundaries are shown on the Flood Insurance Rate Map (Exhibit 2). On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE), and the 500-year floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 100-year floodplain boundary is shown on the Flood Insurance Rate Map (Exhibit 2).

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0

foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as a minimum standard that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this study were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections (Table 2). The computed floodways are shown on the Flood Insurance Rate Map (Exhibit 2). In cases where the floodway and 100-year floodplain boundaries are either close together or collinear, only the floodway boundary is shown. Portions of the floodway widths for the Susquehanna River, Tunkhannock Creek, and Swale Brook extend beyond the corporate limits.

The area between the floodway and 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.

5.0 INSURANCE APPLICATIONS

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. The zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Susquehanna River								
A	720	874	31,108	8.0	595.3	595.3	596.0	0.7
B	1,860	698	28,234	8.8	595.7	595.7	596.4	0.7
C	2,870	656	25,548	9.7	596.2	596.2	596.9	0.7
D	4,320	599	23,871	10.4	597.3	597.3	598.0	0.7
E	5,240	728	29,101	8.5	598.2	598.2	599.0	0.8
F	6,830	1,291	35,868	6.9	599.2	599.2	600.0	0.8
G	8,205	1,217	41,634	6.0	599.8	599.8	600.5	0.7
H	9,395	836	28,575	8.7	599.8	599.8	600.5	0.7
I	10,695	869	29,847	8.3	600.2	600.2	601.0	0.8
J	12,695	861	26,732	9.3	600.9	600.9	601.6	0.7
K	14,125	956	31,310	7.9	602.0	602.0	602.7	0.7
L	15,445	862	27,888	8.9	602.3	602.3	602.9	0.6
M	17,635	1,003	32,144	7.7	603.6	603.6	604.4	0.8
N	20,405	929	28,733	8.6	605.6	605.6	606.3	0.7
O	21,545	1,058	31,887	7.8	605.6	605.6	606.3	0.7
P	22,095	1,206	34,564	7.2	606.0	606.0	606.7	0.7
Q	23,695	896	31,316	7.9	606.6	606.6	607.3	0.7
R	25,165	680	25,809	9.6	607.1	607.1	607.9	0.8
S	25,805	667	26,089	9.5	607.4	607.4	608.1	0.7
T	27,355	763	33,791	7.3	608.6	608.6	609.4	0.8
U	28,355	921	33,390	7.4	608.9	608.9	609.6	0.7
V	29,755	1,116	39,313	6.3	609.4	609.4	610.2	0.8
W	33,155	726	29,921	8.0	610.1	610.1	610.9	0.8
X	34,805	889	33,075	7.2	610.7	610.7	611.5	0.8
Y	36,035	1,203	34,379	6.9	611.1	611.1	611.9	0.8
Z	37,785	1,390	36,691	6.5	611.8	611.8	612.6	0.8
AA	39,755	1,580	41,928	5.7	612.6	612.6	613.3	0.7

[1]Feet above origin of study
[2]This width extends beyond corporate limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF TUNKHANNOCK, PA
(WYOMING CO.)

FLOODWAY DATA

SUSQUEHANNA RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE
Susquehanna River (continued)								
AB	42,475[1]	755[3]	28,295	8.4	613.1	613.1	613.8	0.7
AC	44,375[1]	800[3]	31,379	7.6	614.0	614.0	614.6	0.6
AD	44,715[1]	875[3]	32,755	7.3	614.2	614.2	614.9	0.7
AE	46,365[1]	1,097[3]	36,393	6.5	614.8	614.8	615.4	0.6
Tunkhannock Creek								
A	540[2]	433[3]	8,904	4.8	609.5	592.7[4]	593.7	1.0
B	720[2]	665[3]	8,276	5.1	609.5	600.5[4]	600.5	0.0
C	1,050[2]	544[3]	6,965	6.1	609.5	600.4[4]	600.4	0.0
D	1,420[2]	509[3]	6,339	6.7	609.5	600.5[4]	600.5	0.0
E	1,810[2]	513[3]	6,951	6.1	609.5	600.9[4]	600.9	0.0
F	2,180[2]	465[3]	5,911	7.2	609.5	600.9[4]	600.9	0.0
G	2,510[2]	384[3]	6,128	6.9	609.5	601.4[4]	601.6	0.2
H	2,860[2]	320[3]	5,845	7.3	609.5	601.6[4]	601.8	0.2
I	3,200[2]	247[3]	5,019	8.5	609.5	601.6[4]	601.9	0.3
J	3,380[2]	230[3]	5,093	8.3	609.5	602.8[4]	603.0	0.2
K	3,870[2]	262	5,133	8.3	609.5	603.2[4]	603.4	0.2
L	4,330[2]	284	5,798	7.3	609.5	603.7[4]	603.9	0.2
M	4,700[2]	260	5,830	7.3	609.5	604.0[4]	604.2	0.2
N	5,205[2]	209	4,093	10.4	609.5	604.2[4]	604.4	0.2
O	6,250[2]	248	5,002	8.5	609.5	605.9[4]	606.1	0.2
P	7,240[2]	521	5,713	7.4	609.5	606.2[4]	606.9	0.7
Q	8,395[2]	596	5,940	7.1	609.5	607.8[4]	608.4	0.6
R	8,925[2]	488	5,458	7.8	609.5	608.3[4]	608.9	0.6
S	9,925[2]	280	4,786	8.9	610.1	610.1	610.7	0.6
T	10,915[2]	500	9,458	4.5	613.8	613.8	614.5	0.7

[1]Feet above origin of study
[2]Feet above confluene with Susquehanna River
[3]This width extends beyond corporate limits
[4]Elevation computed without consideration of backwater effects from Susquehanna River

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF TUNKHANNOCK, PA
(WYOMING CO)

FLOODWAY DATA

SUSQUEHANNA RIVER - TUNKHANNOCK CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Tunkhannock Creek (continued)								
U	11,890	500	8,627	4.9	614.4	614.4	615.0	0.6
V	14,490	1,320	12,771	3.3	617.3	617.3	617.8	0.5
W	15,815	655	6,812	6.2	617.6	617.6	618.2	0.6
X	16,585	450	5,779	7.3	618.3	618.3	618.8	0.5
Y	17,030	290	4,469	9.5	618.6	618.6	619.1	0.5
Z	17,480	214	4,265	10.0	621.2	621.2	621.6	0.4
AA	17,995	241	4,632	9.2	621.8	621.8	622.2	0.4
AB	18,565	304	5,512	7.7	622.6	622.6	623.0	0.4
AC	19,080	342	6,344	6.7	623.3	623.3	623.7	0.4
AD	19,725	361	5,808	7.3	623.3	623.3	623.8	0.5
AE	20,355	430	5,986	7.1	623.9	623.9	624.5	0.6
AF	21,075	512	7,232	5.9	624.9	624.9	625.7	0.8
AG	21,525	580	8,305	5.1	625.3	625.3	626.1	0.8
AH	22,015	605	8,184	5.2	625.6	625.6	626.4	0.8
AI	22,905	758	9,903	4.3	626.1	626.1	626.9	0.8
AJ	23,370	819	12,172	3.5	626.3	626.3	627.1	0.8
AK	24,090	983	14,304	3.0	626.7	626.7	627.5	0.8
AL	24,770	651	8,394	5.1	627.1	627.1	627.8	0.7
AM	26,780	764	10,613	3.8	631.9	631.9	632.8	0.9
AN	27,460	726	9,448	4.2	632.4	632.4	633.2	0.8
AO	28,060	739	9,669	4.1	633.2	633.2	633.8	0.6
AP	28,665	915	11,365	3.5	633.7	633.7	634.5	0.8
AQ	29,985	1,105	13,618	2.9	635.4	635.4	636.2	0.8
AR	30,880	991	11,275	3.6	636.1	636.1	636.8	0.7
AS	31,485	1,046	11,282	3.6	636.8	636.8	637.5	0.7
AT	32,195	1,020	11,563	3.5	637.6	637.6	638.2	0.6

[1]Feet above confluence with Susquehanna River

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF TUNKHANNOCK, PA
(WYOMING CO.)

FLOODWAY DATA

TUNKHANNOCK CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Tunkhannock Creek (continued)								
AU	32,860[1]	790	8,088	5.0	638.2	638.2	638.7	0.5
AV	33,495[1]	785	7,779	5.2	638.9	638.9	639.4	0.5
AW	34,380[1]	888	6,588	6.1	639.7	639.7	640.2	0.5
AX	35,275[1]	1,140	8,750	4.6	640.9	640.9	641.6	0.7
Swale Brook								
A	6,072[2]	40[3]	183	12.3	649.2	649.2	649.2	0.0
B	6,272[2]	50	238	9.5	653.1	653.1	653.7	0.6
C	6,562[2]	32	171	13.2	659.0	659.0	660.0	1.0
D	6,842[2]	57	288	7.8	665.3	665.3	666.2	0.9

[1]Feet above confluence with Susquehanna River
[2]Feet above confluence with Tunkhannock Creek
[3]This width extends beyond corporate limits

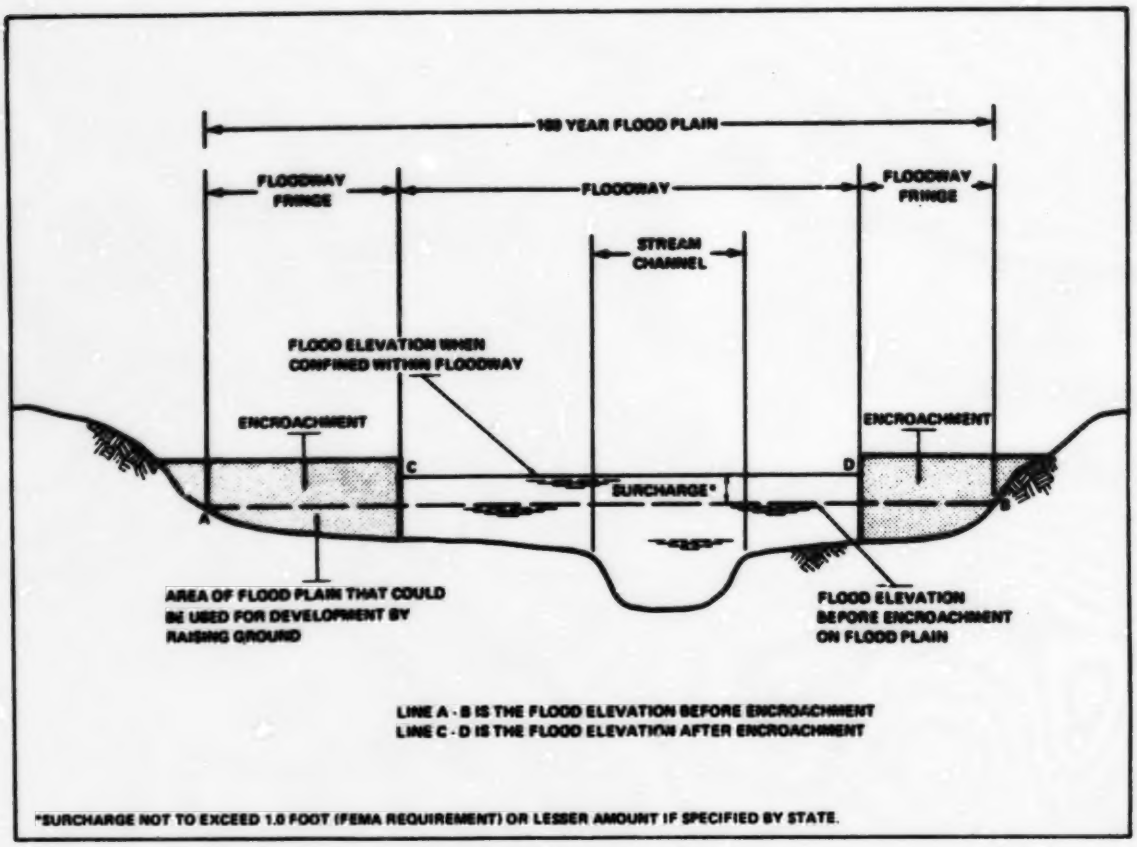
TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF TUNKHANNOCK, PA
(WYOMING CO.)

FLOODWAY DATA

TUNKHANNOCK CREEK - SWALE BROOK


100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE A - B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE C - D IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

FLOODWAY SCHEMATIC Figure 2

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-depths derived from the detailed hydraulic analyses are shown within this zone.

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Zone A99

Zone A99 is the flood insurance rate zone that corresponds to areas of the 100-year floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or depths are shown within this zone.

Zone V

Zone V is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no base flood elevations are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain,and to areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

Zone D

Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 100- and 500-year floodplains. Floodways and the locations of selected cross sections used in the hydraulic analyses and floodway computations are shown where applicable.

7.0 OTHER STUDIES

A Flood Insurance Study for the Township of Eaton has been prepared (Reference 3). The results of this study are in complete agreement with the results of that study. The maps and profiles in this study include the effects of the new State Route 29 bridge crossing the Susquehanna River, which resulted from a recent bridge replacement.

A Flood Insurance Study has also been prepared for the Borough of Tunkhannock (Reference 5). The results of this study do not agree with the results of that study because of a revision to the peak discharge-frequency curve that resulted from the March 1986 flood. The computed water-surface elevations for this study were based on the revised discharges.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting FEMA, the Natural and Technological Hazards Division, Liberty Square Building (Second Floor), 105 South Seventh Street, Philadelphia, Pennsylvania 19106.

9.0 BIBLIOGRAPHY AND REFERENCES

1. U. S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Number of Inhabitants, Pennsylvania, Washington, D. C., U. S. Government Printing Office, 1981.

2. U. S. Department of the Interior, Geological Survey, 1975 Water Resources Data for Pennsylvania, Surface Water Records, Harrisburg, Pennsylvania, 1976.

3. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study, Township of Eaton, Wyoming County, Pennsylvania, Washington, D. C., May 1, 1980.

4. U. S. Department of the Interior, Geological Survey, Office of Water Data Collection, Interagency Advisory Committee on Water Data, "Guidelines for Determining Flood Flow Frequency," Bulletin 17B, Reston, Virginia, Revised September 1981.

5. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study, Borough of Tunkhannock, Wyoming County, Pennsylvania, Washington, D. C., December 18, 1979.

6. U. S. Army Corps of Engineers, New York District, Hydrological Study, Tropical Storm Agnes, New York, New York, December 1975.

7. Litton Aero Service, prepared for the Susquehanna River Basin Commission, Topographic Maps compiled from aerial photographs, Scale 1:2,400, Contour Interval 5 Feet: Susquehanna River, Wyoming County, Pennsylvania, November 1975.

8. U. S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water Surface Profiles, Generalized Computer Program, Davis, California, December 1984.

9. Pace Aerial Survey, Inc., Topographic Maps compiled from aerial photographs, Scale 1:2,400, Contour Interval 4 Feet: Tunkhannock Creek, Wyoming County, Pennsylvania, March 1985.

10. U. S. Department of the Interior, Geological Survey, 7.5-Minute Series Topographic Maps, Scale 1:24,000, Contour Interval 20 Feet: Tunkhannock, Pennsylvania.

11. U. S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Township of Tunkhannock, Wyoming County, Pennsylvania, June 4, 1976.

EXHIBIT 3 - ELEVATION REFERENCE MARKS

Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 1	02	619.19	Railroad spike in base of power pole located approximately 2.8 miles north of crossing of CONRAIL with Bridge Street (State Routes 29 and 309), approximately 50 feet east of centerline of northbound tracks, and approximately 0.7 mile north of mile marker No. 209.
RM 2	02	613.38	Railroad spike in base of power pole No. 309-15, located approximately 2.5 miles north of crossing of CONRAIL with Bridge Street (State Route 29 and 309), approximately 50 feet east from centerline of northbound tracks, and approximately 1,818 feet north of mile marker No. 209.
RM 3	02	612.11	Railroad spike in base of power pole located approximately 2.1 miles north of crossing of CONRAIL with Bridge Street (State Routes 29 and 309), approximately 50 feet east from centerline of northbound tracks, and approximately 187 feet south of mile marker No. 209.
RM 4	02	613.40	Railroad spike in base of power pole located approximately 1.7 miles north of crossing of CONRAIL with Bridge Street (State Routes 29 and 309), approximately 50 feet east from centerline of northbound tracks, and approximately 1.6 miles north of mile marker No. 207.
RM 5	02	615.45	Railroad spike in base of power pole located approximately 6,935 feet north of crossing of CONRAIL with Bridge Street (State Routes 29 and 309), approximately 53 feet east from centerline of south bound tracks, and approximately 1.2 miles north of mile marker No. 207.
RM 6	04	611.86	Railroad spike in base of power pole located approximately 0.9 mile west of crossing of CONRAIL with Bridge Street (State Routes 29 and 309), approximately 52 feet north from centerline of tracks, and approximately 4,415 feet north of mile marker No. 207.

EXHIBIT 3 - ELEVATION REFERENCE MARKS - continued

Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 7	04	608.42	Railroad spike in base of power pole located approximately 0.5 mile east of crossing of CONRAIL with Bridge Street (State Routes 29 and 309), approximately 30 feet north from centerline of tracks, and approximately 135 feet north of mile marker No. 206.2.
RM 8	04	604.51	Railroad spike in base of power pole located approximately 0.8 mile east of crossing of CONRAIL (formerly Lehigh Valley Railroad) with Bridge Street (State Routes 29 and 309), approximately 40 feet north from centerline of tracks, and approximately 600 feet west of mile marker No. 206.
RM 9	04	608.96	Railroad spike in base of power pole located approximately 1.2 miles south of crossing of CONRAIL (formerly Lehigh Valley Railroad) with Bridge Street (State Routes 29 and 309), approximately 26 feet east from centerline of tracks, and approximately 1,400 feet south of mile marker No. 206.
RM 10	04	606.73	Railroad spike in base of power pole located approximately 1.5 miles southeast of crossing of CONRAIL (formerly Lehigh Valley Railroad) with Bridge Street (State Routes 29 and 309), approximately 28 feet east from centerline of tracks, and approximately 0.6 mile south of mile marker No. 206.
RM 11	04	601.84	Railroad spike in base of power pole located approximately 2.0 miles south of crossing of CONRAIL (formerly Lehigh Valley Railroad) with Bridge Street (State Routes 29 and 309), approximately 40 feet east from centerline of tracks, and approximately 50 feet south of mile marker No. 205.

EXHIBIT 3 - ELEVATION REFERENCE MARKS - continued

Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 12	04	621.22	Chiseled square on northwest corner of headwall, located approximately 19 feet north from edge of road (U. S. Route 6), approximately 1,000 feet east of junction of U. S. Route 6 and State Route 92 in the Borough of Tunkhannock, and approximately 58 feet west of power pole No. CT CO. 30.
RM 13	04	686.50	Chiseled square on headwall, located approximately 12 feet southeast from edge of road (U. S. Route 6), approximately 0.6 mile east of junction of U. S. Route 6 and State Route 92 in the Borough of Tunkhannock, approximately 30 feet southwest of power pole No. CT CO. CA 41-1/2, and approximately 575 feet northeast from billboards along south side of U. S. Route 6.
RM 14	04	610.22	Chiseled square on northeast abutment of bridge over Tunkhannock Creek, located approximately 3.5 feet east from edge of road (U. S. Route 6), approximately 0.8 mile east of junction of U. S. Route 6 and State Route 92 in the Borough of Tunkhannock, and approximately 50 feet southwest of power pole No. 1/1.
RM 15	04	621.51	Chiseled square on northeast corner of headwall, located approximately 1.32 feet west from edge of road (U. S. Route 6), approximately 1.0 mile east of junction of U. S. Route 6 and State Route 92 in the Borough of Tunkhannock, and approximately 14 feet northeast of power pole No. CT CO. CA/5/1 at station marker 0/55.

EXHIBIT 3 - ELEVATION REFERENCE MARKS - continued

Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 16	04	644.42	Chiseled square on northeast corner of concrete headwall at intersection of U. S. Route 6 and Shadowbrook Drive, located approximately 13.2 feet north from edge of road for Shadowbrook Drive, approximately 12.6 feet east from edge of road for U. S. Route 6, 1.2 miles east from junction of U. S. Route 6 and State Route 92 in the Borough of Tunkhannock, and approximately 60 feet southwest from station marker 0/65.
RM 17	04	622.60	Chiseled square on southeast corner of wing wall bridge over Billings Mill Brook, located approximately 6.2 feet south from edge of road, approximately 2,500 feet west from intersection of unnamed road and U. S. Route 6, approximately 1.6 miles from intersection of Sunnyside Road and U. S. Route 6, and approximately 116 feet west of power pole No. CT CO. CB/18-IIT 62.
RM 18	04	621.68	Chiseled square on northeast abutment of bridge over Tunkhannock Creek, located approximately 5 feet southeast from edge of road (U. S. Route 6), approximately 1.6 miles west of junction of U. S. Route 6 and State Route 92 in the Borough of Tunkhannock, and approximately 70 feet south of power pole No. CT CO. CA/67.
RM 19	05	653.69	Chiseled square on top of southeast corner of headwall of box culvert, located approximately 10.5 feet south from edge of road (U. S. Route 6), approximately 0.5 mile west of junction of U. S. Route 6 and State Route 92 in the Borough of Tunkhannock, and approximately 69 feet southwest of power pole No. IIT-690; CT CO. CA/77.

EXHIBIT 3 - ELEVATION REFERENCE MARKS - continued

Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 20	05	676.30	Chiseled square on northwest corner of L-shaped concrete headwall, located approximately 12.5 feet north from edge of road (U. S. Route 6), approximately 800 feet west of junction of U. S. Route 6 and State Route 92 in the Borough of Tunkhannock, and approximately 265 feet west of station marker 1/30.
RM 21	05	629.97	PDH Disk, not stamped. Disk set on top of south wing wall at southwest end of bridge over Tunkhannock Creek, located approximately 5.5 feet from edge of road (U. S. Route 6), approximately 1,150 feet east from junction of U. S. Route 6 and State Route 92 in Borough of Tunkhannock, and approximately 190 feet east from station marker 0/10.
RM 22	05	668.88	Chiseled square on north corner of concrete headwall, located approximately 15 feet west of centerline of State Route 92, approximately 0.6 mile north of intersection of U. S. Route 6 and State Route 92 in the Borough of Tunkhannock, and approximately 40 feet west of power pole No. CT CE/1/1.
RM 23	05	671.51	Railroad spike in base of pole No. CE 23, located approximately 16.5 feet east from centerline of State Route 92 in Borough of Tunkhannock, approximately 0.9 mile north from intersection of U. S. Route 6 and State Route 92.
RM 24	05	693.13	Chiseled square on northeast corner of stone headwall, located approximately 1.3 miles north from intersection of U. S. Route 6 and State Route 92 in Borough of Tunkhannock, approximately 17 feet north from centerline of State Route 92, and approximately 34 feet north of power pole No. CT CO. C3E/7.

EXHIBIT 3 - ELEVATION REFERENCE MARKS - continued

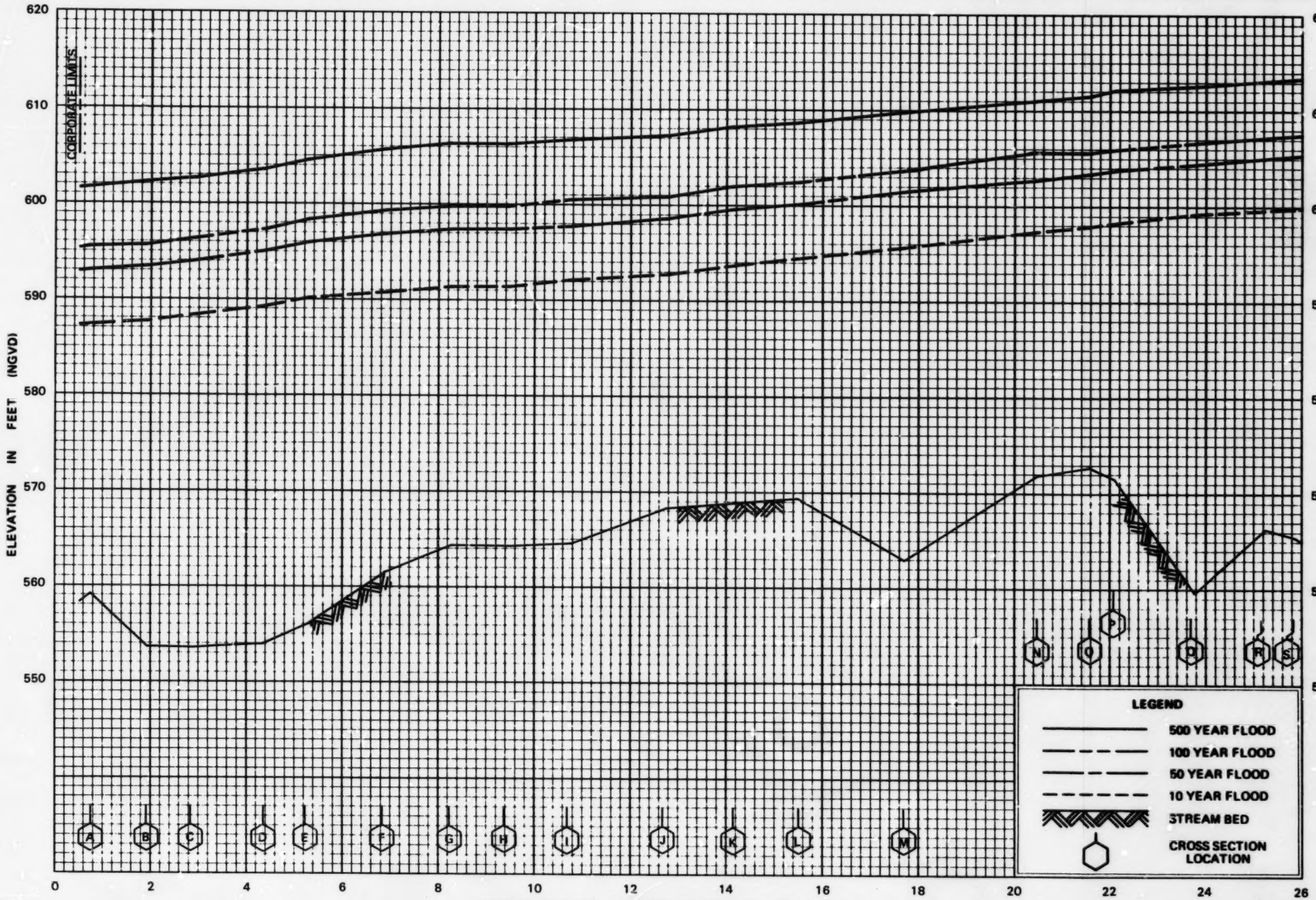
Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 25	05	669.11	Chiseled square on northeast corner of inlet, located approximately 1.2 miles east from intersection of U. S. Route 6 and State Route 92 in Borough of Tunkhannock, approximately 10 feet south from edge of U. S. Route 6, and approximately 63 feet west from station marker 0/65.
RM 26	05	639.81	Chiseled square on 4-foot by 8-foot flat rock, located approximately 1.6 miles east from intersection of U. S. Route 6 and State Route 92 in Borough of Tunkhannock, approximately 23 feet north from edge of U. S. Route 6, and approximately 223 feet west from station marker 0/90.
RM 27	07	606.21	Railroad spike in base of power pole located approximately 2.4 miles south of crossing of CONRAIL (formerly Lehigh Valley Railroad) with Bridge Street (State Routes 29 and 309), approximately 28 feet east from centerline of tracks, and approximately 1,685 feet south of mile marker No. 205.
RM 28	07	600.10	Railroad spike in base of power pole located approximately 2.7 miles south of crossing of CONRAIL (formerly Lehigh Valley Railroad) with Bridge Street (State Routes 29 and 309), approximately 30 feet east from centerline of tracks, and approximately 0.7 mile south of mile marker No. 205.
RM 29	07	608.46	Railroad spike in base of power pole located approximately 3.0 miles south of crossing of CONRAIL (formerly Lehigh Valley Railroad) with Bridge Street (State Routes 29 and 309), approximately 30 feet north from centerline of tracks, and approximately 325 feet south of mile marker No. 204.

EXHIBIT 3 - ELEVATION REFERENCE MARKS - continued

Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 30	07	604.66	Railroad spike in base of power pole located approximately 3.4 miles south of crossing of CONRAIL (formerly Lehigh Valley Railroad) with Bridge Street (State Routes 29 and 309), approximately 30 feet north from centerline of tracks, and approximately 2,375 feet south of mile marker No. 204.
RM 31	07	591.70	Standard disk stamped T-57 1934. Disk is located approximately 3.9 miles south of Tunkhannock along CONRAIL (formerly Lehigh Valley Railroad), approximately 0.3 mile north of mile marker No. 203 at 10-foot masonry arch culvert, in north end of west headwall, approximately 20 feet west from centerline of south bound track, and approximately 11 feet below top of rail.
RM 32	07	594.55	Railroad spike in base of power pole located approximately 4.2 miles south of crossing of CONRAIL (formerly Lehigh Valley Railroad) with Bridge Street (State Routes 29 and 309), approximately 30 feet west from centerline of south bound tracks, and approximately 880 feet south of mile marker No. 203.
RM 33	07	591.29	Railroad spike in base of power pole located approximately 4.5 miles south of crossing of CONRAIL (formerly Lehigh Valley Railroad) with Bridge Street (State Routes 29 and 309), approximately 30 feet west from centerline of south bound tracks, and approximately 0.5 mile south of mile marker No. 203.
RM 34	07	596.91	Railroad spike in base of power pole located approximately 4.9 miles south of crossing of CONRAIL (formerly Lehigh Valley Railroad) with Bridge Street (State Routes 29 and 309), approximately 35 feet east from centerline of tracks, and approximately 465 feet south of mile marker No. 202.

EXHIBIT 3 - ELEVATION REFERENCE MARKS - continued

Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 35	07	596.73	Railroad spike in base of power pole located approximately 5.3 miles south of crossing of CONRAIL (formerly Lehigh Valley Railroad) with Bridge Street (State Routes 29 and 309), approximately 30 feet east from centerline of tracks, and approximately 1,685 feet south of mile marker No. 202.
RM 36	07	598.34	Railroad spike in base of power pole located approximately 5.7 miles south of crossing of CONRAIL (formerly Lehigh Valley Railroad) with Bridge Street (State Routes 29 and 309), approximately 30 feet east from centerline of tracks, and approximately 0.7 mile south of mile marker No. 202.



* THE ORIGIN OF STUDY IS LOCATED 505 FEET DOWNSTREAM OF THE DOWNSTREAM CORPORATE LIMITS OF THE TOWNSHIP OF TUNKHANNOCK

FLOOD PROFILES

SUSQUEHANNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF TUNKHANNOCK, PA

(WYOMING CO.)

01P

ELEVATION IN FEET (NGVD)

630
620
610
600
590
580
570
560

CONFLUENCE OF TUNKHANNOCK CREEK

STATE ROUTES 29 & 309 (BRIDGE STREET)

CORPORATE LIMITS

T U V W X Y Z AA AB AC AD AE

LEGEND

500 YEAR FLOOD
100 YEAR FLOOD
50 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
CROSS SECTION LOCATION

26 28 30 32 34 36 38 40 42 44 46 48

STREAM DISTANCE IN THOUSANDS OF FEET ABOVE ORIGIN OF STUDY *

* THE ORIGIN OF STUDY IS LOCATED 505 FEET DOWNSTREAM OF THE DOWNSTREAM CORPORATE LIMITS OF THE TOWNSHIP OF TUNKHANNOCK

FLOOD PROFILES

SUSQUEHANNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF TUNKHANNOCK, PA
(WYOMING CO.)

02P

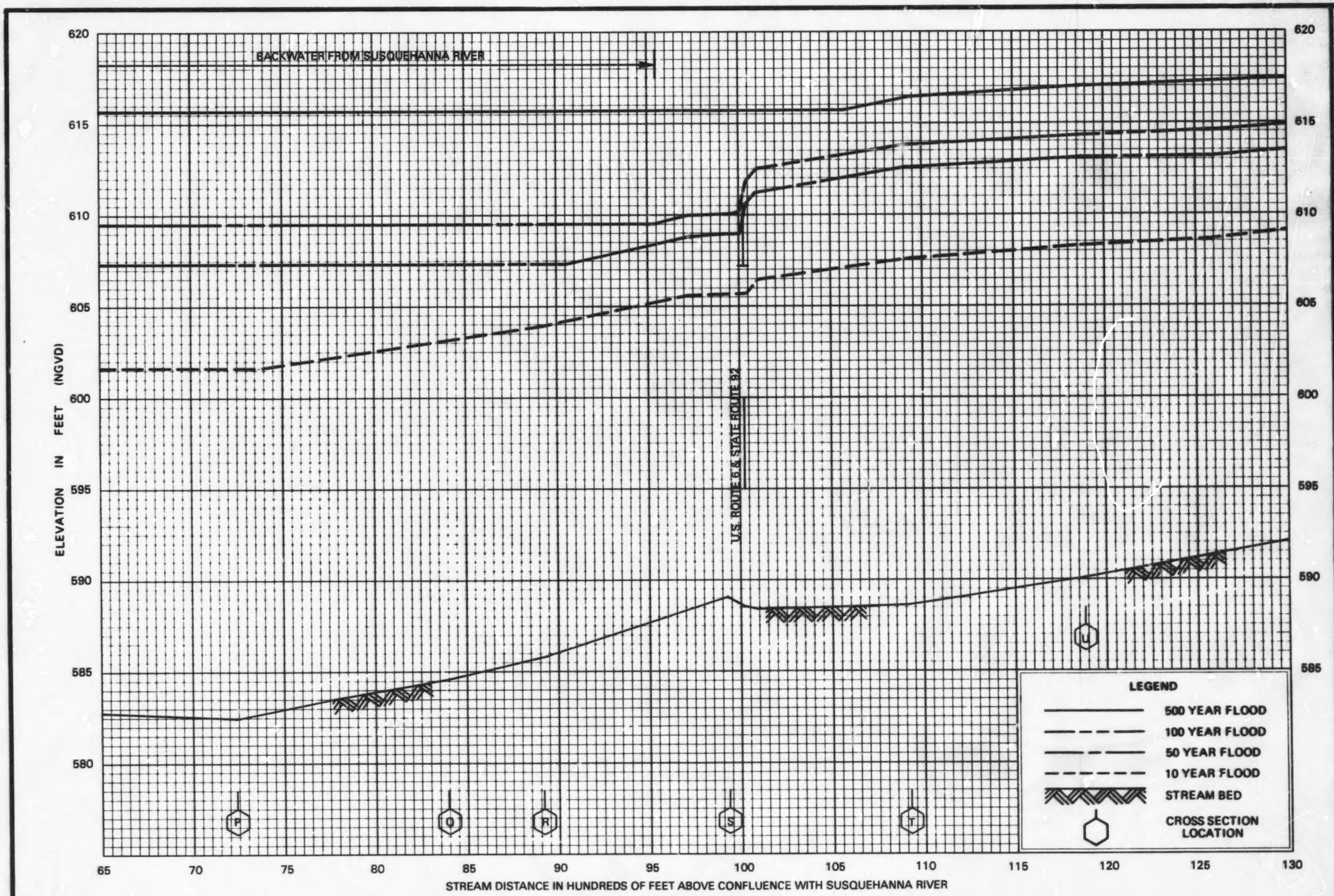
FLOOD PROFILES

TUNKHANNOCK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF TUNKHANNOCK, PA
(WYOMING CO.)

03P



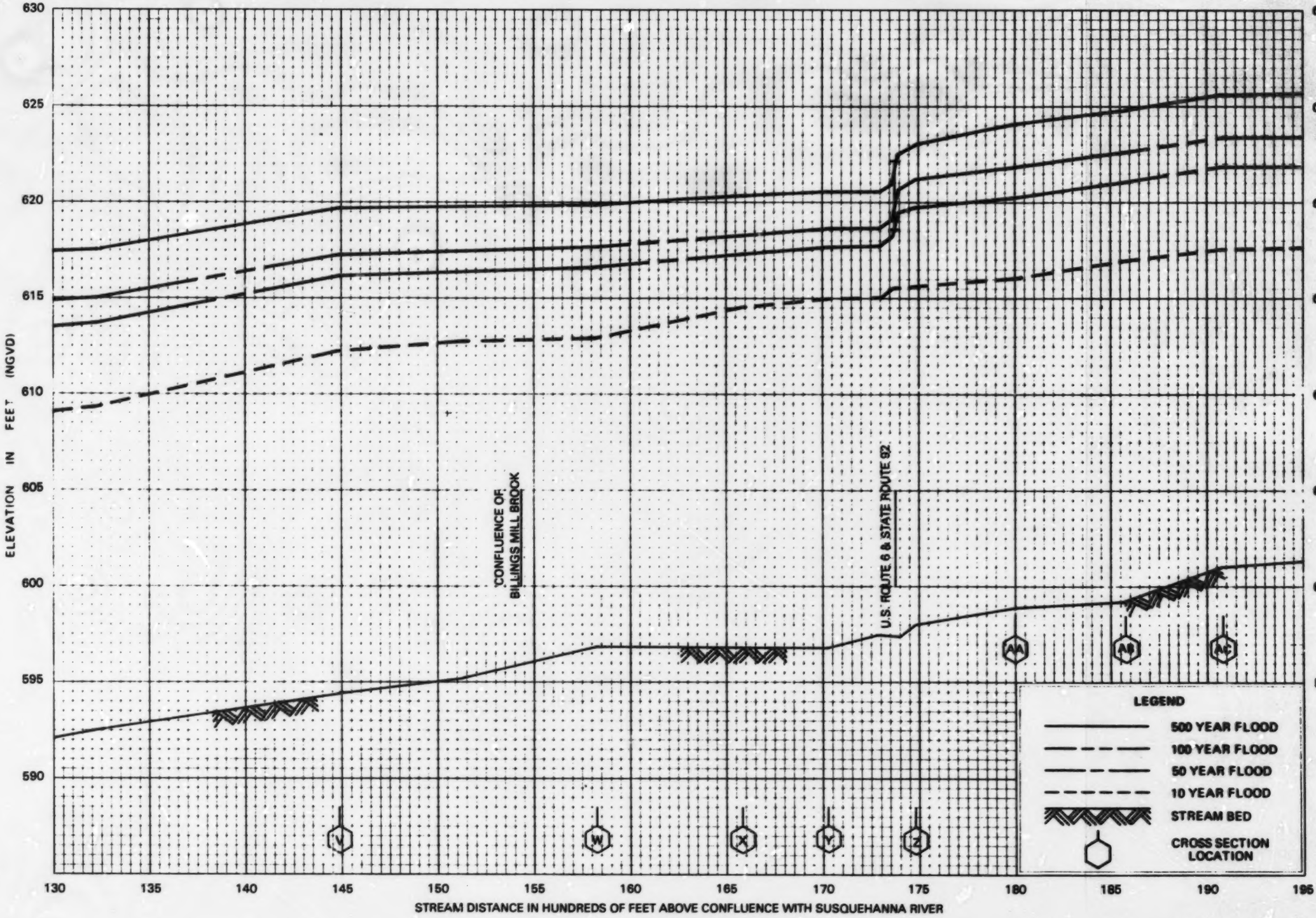
FLOOD PROFILES

TUNKHANNOCK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF TUNKHANNOCK, PA
(WYOMING CO.)

04P



FLOOD PROFILES

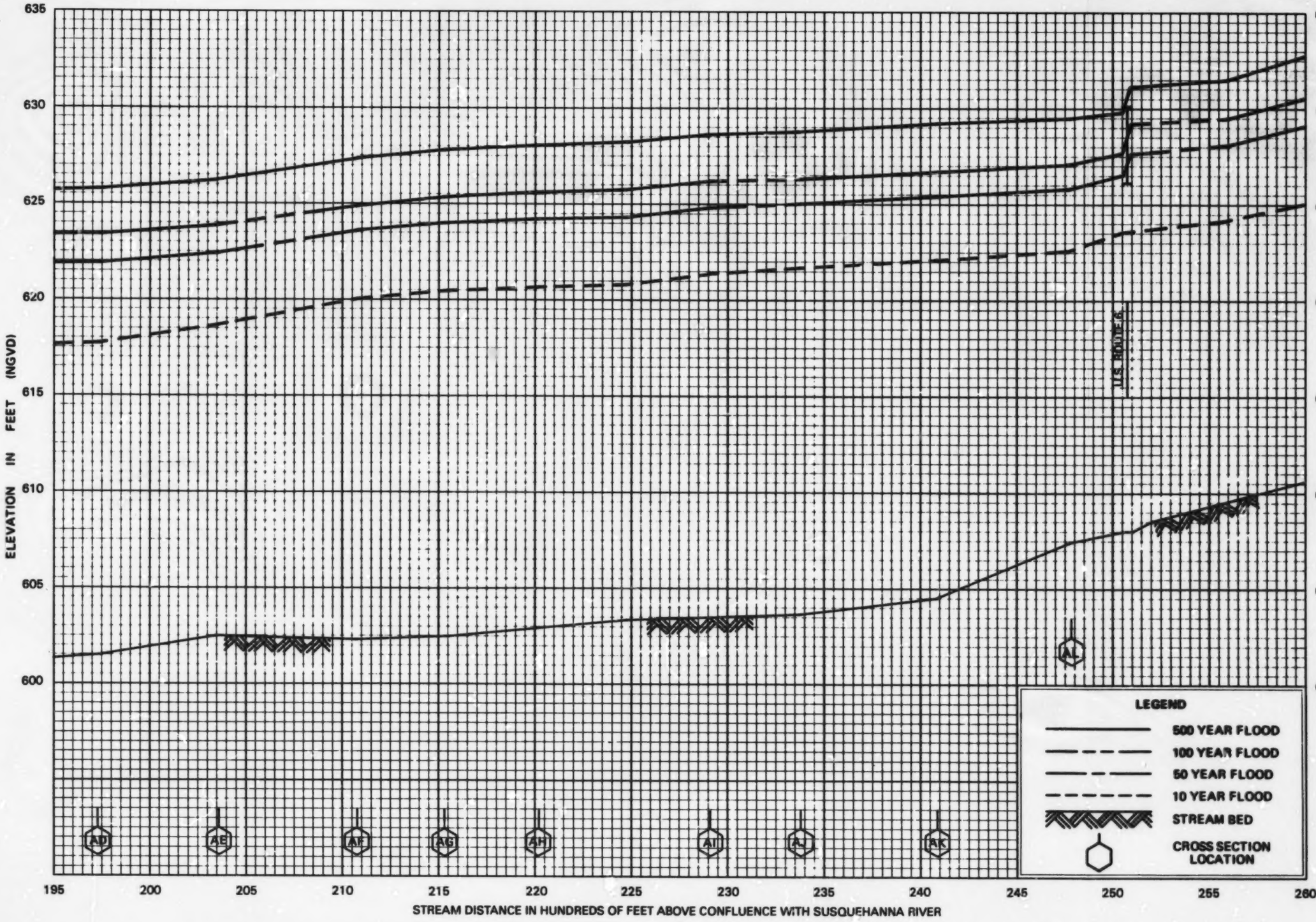
TUNKHANNOCK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF TUNKHANNOCK, PA

[illegible] CO.)

05P



FLOOD PROFILES

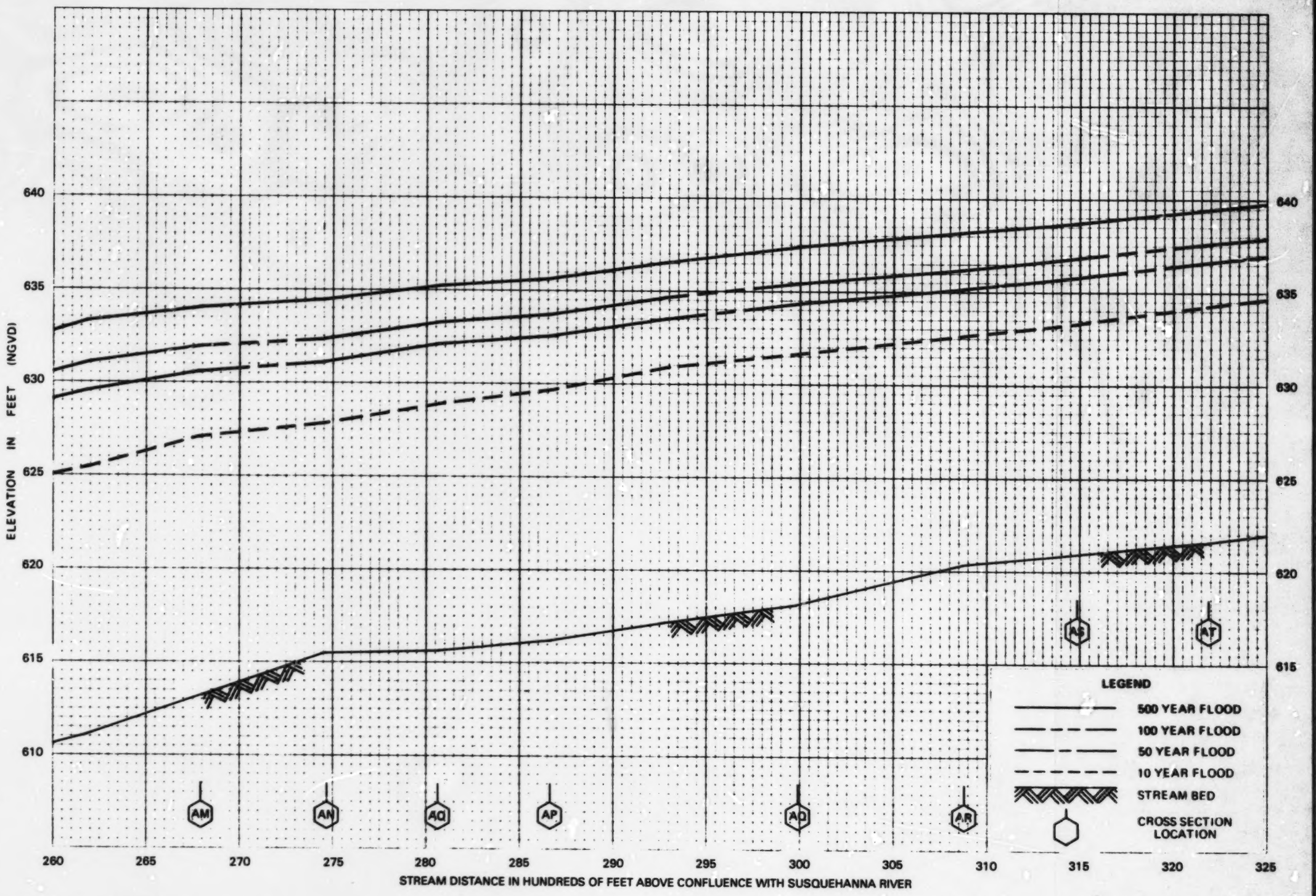
TUNKHANNOCK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF TUNKHANNOCK, PA

(WYOMING CO.)

06P



FLOOD PROFILES

TUNKHANNOCK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF TUNKHANNOCK, PA
(WYOMING CO.)

07P

FLOOD PROFILES

TUNKHANNOCK CREEK

ELEVATION IN FEET (NGVD)

645
640
635
630
625
620

LIMIT OF DETAILED STUDY

AU AV AW AX

325 330 335 340 345 350 355

STREAM DISTANCE IN HUNDREDS OF FEET ABOVE CONFLUENCE WITH SUSQUEHANNA RIVER

LEGEND

- 500 YEAR FLOOD
- 100 YEAR FLOOD
- 50 YEAR FLOOD
- 10 YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF TUNKHANNOCK, PA

(WYOMING CO.)

08P

FLOOD PROFILES

SWALE BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF TUNKHANNOCK, PA
(WYOMING CO.)

09P